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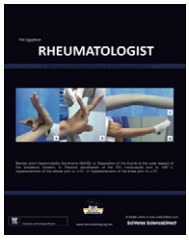


ORIGINAL ARTICLE

# Musculoskeletal disorders among Tunisian hospital staff: Prevalence and risk factors

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**Abstract** *Aim of the work:* Musculoskeletal disorders (MSD) represent a significant occupational problem among hospital staff; however, data on musculoskeletal health of hospital staff are sparse. This study sought to determine the prevalence of MSD, their epidemiologic data and the associated risk factors.

*Methods:* A previously self administered questionnaire sought information on demographics, prevalence and pattern of MSD, associated risk factors was employed as the survey instrument. A total of 520 questionnaires were distributed to hospital staff but only 433 questionnaires was valid. Eighty-seven of the returned questionnaires were excluded because of incomplete data.

*Results:* The prevalence of MSD among hospital staff was 65.4%. Musculoskeletal disorders occurred mostly in low back (74.5%), neck (38.1%), and knees (31.1%).

Factors associated to MSD were age ($P < 0.001$), female gender ($P < 0.001$), years of service ($P < 0.001$) as well as prolonged standing or sitting ($P = 0.016$ and 0.023, respectively). No significant association was found between repetitive movement, uncomfortable postures, heavy load handling, working on night shifts, stress and the presence of MSD.

*Conclusion:* A high proportion of hospital staff reported MSD at some body site with the low back being injured most often. Education programs on prevention and coping strategies for musculoskeletal disorders are recommended for hospital staff in order to reduce the rate of occupational hazards and also promote efficiency in patient care.



## 1. Introduction

The prevalence of work-related musculoskeletal disorders (MSD) is significant in many professions, and this has had a marked impact on the professionals, businesses, governments, and society at large. There are over 200 types of musculoskeletal conditions, which include all types of arthritis and conditions affecting muscles, bones, soft tissue, joints and spine [1,2].

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The etiology and risk factors associated with many of these occupational injuries are not well understood. Risk factors that have been previously identified include history of previous injury, severity of injury, occupations that involve the maintenance of awkward postures and movements over a prolonged time interval, occupations that require repetitive and forceful tasks, and occupations requiring high levels of activity [1]. MSD' medical and socio-professional consequences are important [3].

MSD are frequent among hospital staff. Their prevalence ranged from 43% to 78% [4–8]. Most previous studies investigated the prevalence rates of MSD through one category of hospital staff (nurses, nursing aides, operating room nurses, physical therapists, midwives, students, secretaries, workers...) [8–14] or through one type of injuries (low back pain, neck pain, shoulder pain...) [14–19].

So we decided to perform an investigation among all categories of hospital staff and concerning all types of MSD reported. Our aim was to collect epidemiological data and to study factors associated with MSD among hospital staff.

## 2. Patients and methods

Our study concerned all professional categories of the Fattouma Bourguiba Teaching Hospital of Monastir (Tunisia). The hospital staff comprised 1527 persons distributed in three professional categories: para medical staff (70.8%), doctors (14.4%) and workers (14.8%). Our investigation consisted of the administration of a standardized questionnaire among 520 agents who accepted to participate in our study. Four hundred and thirty-three surveys were valid. The investigation took place from January to June 2010. This study conforms with the Declaration of Helsinki. The questionnaire was prepared by the investigators in French version. The study subjects were invited to fill in a standardized questionnaire composed of 51 items including personal information (demographic characteristics, civil status, tobacco smoking, sports or extra professional activities, psychological profile including information about the presence or absence of anxiety, depression, sleeplessness or use of sleep medications), professional information (professional category, journey, distance to work...), information related to MSD (MSD' past history, mode of onset, triggering factor, intensity and feature), and MSD' medical and professional consequences during the last 12 months preceding the injury (medical consultation, laboratory and radiological exams, medical and physical treatment, work stop, change of workstation, laborious work restriction and impact on the professional performance).

Respondents were asked to grade the frequency of performing different activities as sometimes, often, always or never. A response of "sometimes" or "never" was considered rare and a response of "often" or "always" was considered frequent.

The respondents are asked to mention if they are in condition of overwork or not, if they correlate their MSD to the kind of their work or not.

The study subjects reported the diagnosis established by their doctors (Rheumatologists, MPRF, orthopedist, neurologist and neurosurgeon).

Non specific MSD were essentially muscle pain without specific diagnosis.

In our study we did not include administrative staff because of the large number of non returned questionnaire.

Collected data have been processed by computer using the software SPSS version 16.0. We expressed data by mean and standard deviation. We used the ANOVA test for comparison between means among MSD and non MSD respondents. The statistical significance level was fixed to 0.05.

## 3. Results

Of the 520 returned surveys, 87 were disqualified as invalid because of a number of unanswered questions and/or impossible responses, so the valid responses were 83.2% (433/520).

Of the 433 valid respondents, 191 (44.1%) were male. The mean age of the respondents was 33.6 years. Their mean height (in kg), weight (in meter) and BMI (in kg/m$^2$) were 72.36 ± 13.9, 1.67 ± 0.08 and 25.6 ± 4.5, respectively. Of these subjects, 228 (53.7%) reported to be overweight/obese, 96 (22.2%) to smoke tobacco and 238 (55%) to have an extra professional activity (sports, agriculture, household...) (Table 1).

Of the 433 valid respondents, 283 had MSD. The prevalence of MSD was 65.4%. The most frequent regions of the body affected by MSD were lumbar and cervical region and knee (87.3%, 45.2% and 31.3%, respectively).

The most frequent symptoms were low back pain (LBP), neck pain and knee pain (74.5%, 45.2% and 31.3%, respectively) (Table 2).

Subjective factors associated to MSD were professional factors and personal factors. Professional factors were: over work, kind of work, physical and mental stress, and guard. Personal factors were activities outside of work like sports and agriculture, aging and hereditary (Table 3).

When analyzing data we found that MSD were significantly associated with individual and professional factors. The percentage of subjects affected by MSD was 60.5% for medical setting (101/167), 72% for paramedical setting (155/215), and 47% (24/51) for workers. Respondents with MSD were significantly older compared with those without MSD ($P = 0.001$). Women significantly complained more often of MSD than men ($P = 0.001$). Also tenure, long service, extra professional activities, prolonged sitting and standing were also significantly more frequent in MSD population ($P = 0.001$, 0.001, 0.045, 0.016 and 0.023, respectively). Although the respondents with MSD were more likely to report repetitive movement, uncomfortable postures, heavy load handling, climbing stairs, mental and physical stress, and guard compared to those without MSD but the difference was not significant (Table 4).

**Table 1** Characteristics of population of valid respondents ($N = 433$).

| A | *n* (%) |
|---|---|
| Male | 191 (44.1) |
| Female | 242 (55.9) |
| Normal weight (BMI <25) | 205 (47.3) |
| Overweight/obese | 228 (53.7) |
| Tobacco smoking | 96 (22.2): Medical setting 40 (9.2), paramedical setting 41(9.4), workers 15 (3.6). |
| Extra professional activity | 238 (55) |

**Table 2** Prevalence of MSD depending on body regions in respondents having MSD ($n$ = 283).

| Body regions $n$ (%) | Pathologies | Effects | % |
|---|---|---|---|
| Lumbar 247 (87.27) | Low back pain | 211 | 74.5 |
| | Sciatica | 36 | 12 |
| Cervical 128 (45.22) | Neck pain | 108 | 38.16 |
| | Cervico brachial neuralgia | 17 | 6 |
| | Cervical myelopathy | 3 | 1 |
| Shoulder 82 (28.97) | Shoulder pain* | 55 | 19.5 |
| | Tendinopathy of the cuff | 24 | 8.5 |
| | Adhesive capsulitis | 3 | 1 |
| Knee 88 (31.09) | Knee pain* | 66 | 23.3 |
| | Osteoarthritis | 15 | 5.3 |
| | Femoro patellar syndrome | 7 | 2.5 |
| Wrist 79 (27.9) | Wrist pain* | 46 | 16.25 |
| | Tendinitis | 27 | 9.5 |
| | Carpal tunnel syndrome | 6 | 2.1 |
| Hip 41 (14.48) | Hip pain* | 35 | 12.36 |
| | Coxarthrosis | 6 | 2 |
| Elbow 30 (10.6) | Epicondylitis, Epitrochleitis | 30 | 10.6 |
| Ankle 48 (17) | Ankle pain* | 48 | 17 |
| Non specific 53 (18.7) | Non specific MSD** | 53 | 18.7 |

* Unexplored symptom.
** Muscle pain without specific diagnosis.

**Table 3** Risk factors reported by respondents having MSD ($n$ = 283).

| | Risk factors reported by respondents | $n$ | % |
|---|---|---|---|
| Professional factors | Overwork | 248 | 87.6 |
| | Kind of work | 111 | 39.2 |
| | Physical stress | 250 | 88.3 |
| | Mental stress | 148 | 52.2 |
| | Working on night shifts | 166 | 58.6 |
| Personal factors | Extraprofessional activities | 108 | 38.1 |
| | Aging | 23 | 8.1 |
| | Hereditary | 19 | 6.7 |

In the general population, smoking did not appear to be associated with MSD. However, in the male population ($n$ = 191, 112 were smokers or former smokers) smoking was significantly associated with the occurrence of MSD ($p$ = 0.04).

## 4. Discussion

Studies have shown that musculoskeletal problems are common in health care workers particularly nurses, nursing aides, and orderlies who have the highest rates of MSD [14,18].

Our results confirm that MSD were frequent among hospital staff. A vast majority of our population (65.4%) had experienced MSD during the past 12 months. Lower back symptoms were found to be the most prevalent problems (74.5%). This is in accord with the findings of the literature. The yearly prevalence of LBP among hospital staff varies from 43% to 76% [6–8,16]. This divergence in LBP prevalence rates reported in the literature can be explained by the methodological heterogeneity used for the assessment of common LBP and the variability of the gender and the age of concerned groups.

In our study, the most other common body regions affected were the neck (38.1%), the knee (31.1%), the shoulder (29%) and the wrist/hand (27.9%). This is also in accordance with the findings of Maumet et al. [8] who found the frequency of neck and shoulder complaints to be 39% and 19.6%, respectively. Indeed, this author had worked on the same category of population as ours. But this study was performed on 403 subjects attending the Occupational Health Department University Hospital for a routine medical consultation. 76.4% of his population had reported MSD localized essentially on the dorsal and lumbar spine (52.9%) and the cervical spine (39%). The prevalence of neck pain reported by operating room nurses was higher (51.9%) in the study of Choobineh et al. [6]. Daraiseh et al. [15] found that only 23.4% of hospital nurses reported severe symptoms of the neck. The one-year prevalence of back and neck pain was 67.3% in the survey of Genevay et al. [18] realized on all categories of the Suisse hospital staff, but they did not precise the prevalence of each condition separately. Knee complaints had the third highest prevalence in our study (31.1%). It was higher in the survey of Chobineh et al. [6] (58.1%) and lower in the survey of Daraiseh et al. [15], Tinubu et al. [17] and Lin et al. [2] (24.4%, 22.4% and 13.2%, respectively). This variance in prevalence can be explained by the difference of population's characteristics (culture, inactivity, diet…). Otherwise the majority of our population was overweight or obese; they had reported frequently climbing stairs and prolonged sitting posture. In the study of Maumet et al. the prevalence of MSD of the lower limb was 21.6% without specifying the anatomic region [8].

In hospital staff, parameters statistically associated with MSD were reported to include age, duration of employment, manual handling, work postures, work control, work organization and patient care needs [6,11,14,16,19,20]. Female gender, smoking and uncomfortable work positions have also been reported as intrinsic risk factors [16,18,21,22].

**Table 4** Risk factors for MSD in respondents ($N = 433$).

| | | MSD | No MSD | *P* |
|---|---|---|---|---|
| | | $n = 283$ | $n = 150$ | |
| Age (years) | Mean ± SD | 35 ± 10 | 31 ± 8.22 | <0.001** |
| Tenure (years) | | 10.2 ± 9.9 | 6,17 ± 7.6 | <0.001** |
| Years of service (years) | | 7.47 ± 8.2 | 4.5 ± 6 | <0.001** |
| BMI (kg/m$^2$) | | 25.8 ± 4.54 | 25.33 ± 36 | |
| Sex (men/women) | | 104/179 | 87/63 | <0.001** |
| Tobacco | No smoking | 216 | 92 | <0.001** |
| | Smoking | 44 | 52 | |
| | Former smoking | 23 | 6 | |
| Category | Medical setting (167) | 101 | 66 | 0.004* |
| | Paramedical setting (215) | 155 | 60 | |
| | Worker (51) | 24 | 27 | |
| Extra professional activity | | | | |
| | Yes | 78 | 54 | 0.045* |
| | No | 205 | 96 | |
| Prolonged standing | Rare | 74 | 25 | |
| | Frequent | 209 | 125 | 0.016* |
| Prolonged sitting | Rare | 211 | 125 | |
| | Frequent | 72 | 25 | 0.023* |
| Repetitive movement | Rare | 64 | 36 | 0.416 |
| | Frequent | 219 | 114 | |
| Uncomfortable postures | Rare | 64 | 114 | 0.07 |
| | Frequent | 219 | 36 | |
| Heavy load handling | Rare | 188 | 110 | 0.085 |
| | Frequent | 95 | 50 | |
| Climbing stairs | Rare | 134 | 90 | 0.086 |
| | Frequent | 149 | 60 | |
| Working on night shifts | Yes | 160 | 86 | 0.478 |
| | No | 123 | 64 | |
| Physical and mental stress | Yes | 167 | 93 | 0.309 |
| | No | 116 | 57 | |

NS: non significant; SD: standard deviation.
* Significant (<0.05).
** Very significant (<0.01).

Despite these findings, statistical analysis of the present data revealed no significant association between, repetitive movement, uncomfortable postures, heavy load handling, working on night shifts, stress and the occurrence of MSD. Otherwise we found that MSD were significantly associated with age ($p = 0.001$), female gender ($p = 0.001$), duration of employment ($p = 0.001$), and prolonged standing or sitting ($p = 0.016$ and 0.023, respectively). Long et al. [14] found in their review that older age was significantly associated with neck/shoulder MSD. As age is often correlated with job tenure, this association may be due to the cumulative effects of long-term physical exposures. The interaction of age and job tenure or career duration is an area for further study, particularly in nurses given the increase in mature-age nursing students [14]. Females constitute the majority of affected individuals. Studies have demonstrated that men do more heavy lifting than women in the same occupation [14,23]. Since males are under-represented in nursing, gender differences remain difficult to be treated clearly [14]. In our study, smoking did not appear to be associated with MSD. However, in the male population ($n = 191$, 112 were smokers or former smokers) smoking was significantly associated with the occurrence of MSD ($p = 0.04$). Our study demonstrated the difficulty of studying the correlation between tobacco and MSD among hospital staff because of the low percentage of female smokers in our society.

Apart from these individual factors, several professional risk factors can influence MSD' prevalence. In our survey, we found an interrelationship between professional categories and MSD. Indeed these were significantly more frequent in paramedical setting (nurses) ($p = 0.04$). Maumet et al. [8] and Genevay et al. [18] found that nurses were more affected by MSD than the other categories. However, several studies showed that administrative staff and workers were more affected by LBP than nurses. In our study we did not include administrative staff because of the large number of non returned questionnaire. But in a previous study focused on LBP, the administrative staffs were not particularly exposed to LBP compared with other categories of hospital workers [12].

In conclusion, a high proportion of hospital staff reported MSD at some body site with the low back being injured most often. Individual risk factors as well as professional risk factors found in our survey are in accordance with the literature. Our study demonstrates the difficulty of studying the correlation between tobacco and MSD among hospital staff because of the low percentage of female smokers in our society.

MSD' medical and socio professional consequences are important [3,24].

Because of the strong prevalence of MSD in hospital staff we recommend that education programs on prevention and coping strategies for MSD be made mandatory for them in order to reduce the rate of MSD among this professional category and to promote efficiency in patient care.

## Conflicts of interest

None.

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